

**CLAIMS**

1. A device for sterilization in production of packages (8), which is adapted for sterilization with a gaseous sterilizing agent kept in the gaseous phase throughout the sterilization process, said device comprising a heating zone (2), a sterilization zone (3) and a venting zone (4), characterised in that it further comprises means for maintaining a higher pressure in the sterilization zone (3) than in the heating zone (2) and venting zone (4).

2. A device as claimed in claim 1, wherein said zones (2, 3, 4) are separated from each other by means of partitionings (6, 7) having openings (6a, 7a) for the passage of packages (8)

3. A device as claimed in claim 1 or 2, which is adapted for sterilization with a gaseous sterilizing agent in the form of gaseous hydrogen peroxide.

4. A device as claimed in any one of the preceding claims, which is adapted to sterilize packages (8) before filling of the packages (8), said packages (8) having an open end (11) and a closed end (12).

5. A device as claimed in claim 4, wherein the heating zone (2) comprises means (13) for heating the packages (8) to a temperature above a dew point of the sterilizing agent used in the sterilization zone (3).

6. A device as claimed in claim 4 or 5, wherein the venting zone (4) comprises means (21, 24) for venting away the sterilizing agent used in the sterilization zone (3) from the packages (8) after sterilization.

7. A device as claimed in any one of claims 4-6, further comprising means (17, 20) for controlling a flow of gaseous sterilizing agent in the sterilization zone (3), such that the gaseous sterilizing agent flows essentially in a direction from the open end (11) of the packages (8) towards the closed end (12) of the packages (8).

8. A device as claimed in claim 7, wherein the means (17, 20) for controlling the flow of gaseous sterilizing agent are arranged to introduce the gaseous sterilizing agent in a top portion (18) of the sterilization zone (3) and to evacuate the gaseous sterilizing agent in a bottom portion (19) of the sterilization zone (3), maintaining a flow of gaseous sterilizing agent essentially from top to bottom.

9. A device as claimed in any one of claims 4-8 further comprising means (21, 24) for controlling a venting air flow in the venting zone (4), such that the venting air flows essentially in a direction from the open end (11) of the packages (8) towards the closed end (12) of the packages (8).

10. A device as claimed in claim 9, wherein the means (21, 24) for controlling the flow of venting air are arranged to introduce the venting air in a top portion (22) of the venting zone (4) and to evacuate the venting air in a bottom portion (23) of the venting zone (4), maintaining a flow of venting air essentially from top to bottom.

11. A device as claimed in any one of claims 4-10, further comprising an ambient temperature sensor for sensing the ambient temperature outside the device (1).

12. A device as claimed in any one of claims 4-11, further comprising an package heating temperature sensor for sensing the temperature of the packages (8) entering the heating zone (2).

13. A device as claimed in any one of claims 4-12, further comprising an entry temperature sensor for sensing the temperature of the packages (8) before entry into the sterilization zone (3).

14. A device as claimed in any one of claims 4-13, further comprising a feedback circuit for controlling the heating in the heating zone (2) based on the temperature of the packages (8).

15. A device as claimed in any one of the preceding claims, further comprising a condensation detector (34) for detecting condensation in the sterilization zone (3)

16. A device as claimed in any one of claims 1-3,  
5 which is adapted to sterilize itself (1) internally.

17. A device as claimed in claim 16, further comprising means (13) for heating the interior of the device (1).

18. A device as claimed in any one of the preceding  
10 claims, comprising a unit (25) for production of the gaseous sterilizing agent.

19. A device as claimed in any one of the preceding claims, further comprising a filling zone (5) for filling packages (8), and means for maintaining a higher pressure  
15 in the filling zone (5) than in the venting zone (4).

20. A method of sterilizing packages (8) in production of the packages (8), said packages (8) having an open end (11) and a closed end (12), wherein a gaseous sterilizing agent is used and kept in the gaseous phase  
20 throughout the sterilization process c h a r a c t e r - i s e d i n that a positive pressure is maintained in a sterilization zone (3) in which the sterilization is performed.

21. A method as claimed in claim 20, wherein gaseous  
25 hydrogen peroxide is used as sterilizing agent.

22. A method as claimed in claim 20 or 21, wherein the packages (8) are passed into a heating zone (2) where they are heated to a temperature above the dew point of the sterilizing agent.

23. A method as claimed in claim 22, wherein the  
30 heated packages (8) are passed through an opening (6a) in a partitioning (6) separating the heating zone (2) and the sterilization zone (3) into the sterilization zone (3), where they are subjected to the gaseous sterilizing agent.  
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24. A method as claimed in claim 23, wherein the sterilized packages (8) are passed through an opening

(7a) in a partitioning (7) separating the sterilization zone (3) and a venting zone (4) into the venting zone (4), where they are subjected to hot sterile air for venting away the sterilizing agent.

5        25. A method as claimed in claim 23 or 24, wherein the gaseous sterilizing agent in the sterilization zone (3) flows essentially in a direction from the open end (11) of the packages (8) towards the closed end (12) of the packages (8).

10        26. A method as claimed in claim 25, wherein the gaseous sterilizing agent is introduced in a top portion (18) of the sterilization zone (3) and evacuated in a bottom portion (19) of the sterilization zone (8), so that a flow of sterilizing agent essentially from top to  
15 bottom is maintained.

27. A method as claimed in any one of claims 24-26, wherein the venting air in the venting zone (4) flows essentially in a direction from the open end (11) of the packages (8) towards the closed end (12) of the packages  
20 (8).

28. A method as claimed in claim 27, wherein the venting air is introduced in a top portion (22) of the venting zone (4) and evacuated in a bottom portion (23) of the venting zone (4), so that an air flow essentially  
25 from top to bottom is maintained.

29. A method as claimed in any one of claims 20-28, wherein the gaseous sterilizing agent is produced by addition of liquid sterilizing agent to hot air.

30        30. A method as claimed in any one of claims 20-29, wherein an ambient temperature and a concentration of sterilizing agent in the sterilization zone (3) are measured and used for controlling the amount of sterilizing agent introduced in the sterilization zone  
(3).

35        31. A method as claimed in any one of claims 22-30, wherein an ambient temperature is measured and used for controlling the heating in the heating zone (2).

32. A method as claimed in any one of claims 22-31, wherein a temperature of the packages (8) entering the heating zone (2) is measured and used for controlling the heating in the heating zone (2).

5        33. A method as claimed in any one of claims 22-32, wherein a temperature of the packages (8) just before they are passed into the sterilization zone (3) is measured and used for controlling the heating in the heating zone (2).

10       34. A method as claimed in any one of claims 29-32, wherein the temperature and flow of air for production of the gaseous sterilizing agent is controlled based on detection of condensation in the sterilization zone (3).

15       35. A method as claimed in any one of claims 24-34, wherein a higher pressure is maintained in a filling zone for filling vented packages than in the venting zone (4).